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As part of a larger study investigating the workload of Senior Leaders in the U. S. Army, Europe, the sleep characteristics of key decision-makers were studied. The goal was to assess leaders' amount of sleep and relate their sleep habits to the demands of their actual work environment. Senior Officers (N= 21) in the United States Army completed an initial survey about their work habits, stressors, health, and family commitments. Throughout the study, participants wore and actagraph-monitoring device that measured activity and completed an Activity Survey every 2 weeks. Overall, results showed that higher operational demands and stress were associated with reduced sleep time. Thus it appears that the nature of the work environment is likely to affect the sleep habits of Senior Officers. This relationship needs to be better understood in terms of its possible impact on decision making and well-being given that leaders in any organization need to be able to maximize their performance and well-being during periods of high workload and work stress.

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Measuring Sleep and Work Demands in U.S. Army Senior Leaders

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Introduction: As part of a larger study investigating the workload of Senior Leaders in the U.S. Army, Europe, the basic sleep characteristics of key decision makers were studied. The goal was to assess leaders' amount of sleep and relate their sleep habits to the demands of their actual work environment.

Methods: Participants were 10 male (mean age=48.4; ± 3.4) Senior Leaders in the United States Army. Senior Leaders were operationally defined as officers in the rank of General, or Lieutenant Colonels and Colonels in key staff positions. During the initial data collection participants completed a survey instrument with questions about their work habits, stressors, health and wellbeing, and family commitments. Participants wore an actigraph monitoring devise (AMA-32; Precision Control Devices, Fort Walton Beach FL) that measures activity that can be transformed into accurate sleep/wake periods. Data was downloaded every 1 to 2 weeks and then converted into sleep-wake cycles using the Action-W software (Version 2.1, Activity Research Services, San Diego, CA). At the same time of the download, the participant also completed an Activity Survey. The Activity Survey consisted of self-report items including work hours, amount of sleep, quality of sleep, operational demands, and stress level.

A data set was defined as each time a download and activity survey were completed. These data sets were then merged to create the final data set. The 10 participants contributed a total of 35 data sets. Variables of interest were sleep minutes and the number of sleep episodes as measured by the actigraph and self-reported operational demands and stressors of the job.

Results: Actigraph measured sleep and self-reported sleep were positively correlated (Spearman correlation = 0.524; $p < .01$). The mean sleep time per night as measured by the actigraph was 436 minutes (7.3 hours). This was significantly different ($t=-4.7$, $df=296$, $p<.001$) during the week (Monday through Friday) compared to the weekend (Saturday and Sunday) with an average of 444.7 minutes (7.4 hours) per night during the week and an average of 499.9 minutes (8.3 hours) on a weekend night.

The participants reported working on average 12.19 (± 2.5) hours a day. Number of work hours was negatively associated with amount of sleep (Spearman correlation = - 0.504; $p < .01$).

Those who reported more operational demands in the last 2 weeks (See Figure 1; $t=4.9$, $df=34$; $p<.001$) experienced less sleep in the last 2 weeks than those who had the same or less operational demands. Additionally, higher levels of stress (Spearman correlation = -0.431; $p < .01$) were associated with decreased sleep. Subjective sleep quality was not associated with the amount of sleep, but it was related to number of sleep episodes. Reports of decreased sleep quality were correlated with increased sleep episodes a participant encountered (Spearman correlation = 0.368; $p < .05$).

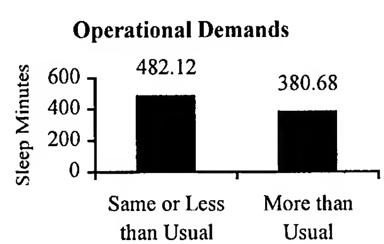

Figure 1. Sleep minutes by levels of operational demands

Conclusion: Results show that higher operational demands and stress are associated with reduced sleep time. Thus it appears that the nature of the work environment is likely to affect the sleep habits of senior leaders. This relationship needs to be better understood in terms of its possible impact on decision making and wellbeing given that leaders in any organization need to be able to maximize their performance and wellbeing during periods of high workload and work stress.

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[1]The views expressed in the article are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government (Para 4-3, AR 360-5).

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Abstract

As part of a larger study investigating the workload of Senior Leaders in the U.S. Army, Europe, the sleep characteristics of key decision-makers were studied. The goal was to assess leaders' amount of sleep and relate their sleep habits to the demands of their actual work environment. Senior Officers (N=21) in the United States Army completed an initial survey about their work habits, stressors, health, and family commitments. Throughout the study, participants wore an actigraph-monitoring device that measured activity and completed an Activity Survey every 2 weeks. Overall, results showed that higher operational demands and stress were associated with reduced sleep time. Thus it appears that the nature of the work environment is likely to affect the sleep habits of Senior Officers. This relationship needs to be better understood in terms of its possible impact on decision making and wellbeing given that leaders in any organization need to be able to maximize their performance and wellbeing during periods of high workload and work stress.

Introduction

Despite their critical importance in determining the success of military operations, the study of Senior Officers in the U.S. Army has been primarily focused on issues of personalities and leadership styles. The goal of such research has been the selection and training of future Army leaders. Surprisingly, the systematic investigation of Senior Officers in command has received very little attention. Yet the workload and responsibilities of Senior Officers in the U.S. Army are arguably the highest of any single military group, thus warranting a careful examination of the Senior Officers experience.

The objective of the current research program is to begin to address four fundamental aspects of Senior Officers' environment and performance:

1. to characterize the workload (or personnel tempo) of Senior Officers in the Army,
2. to develop a descriptive summary of their health,
3. to measure how much sleep Senior Officers receive by having them wear an actigraph monitoring device,
4. to identify relationships between workload and wellbeing, focusing on how Senior Officer performance and wellbeing could be optimized during periods of high workload and operations tempo.

This poster presents findings related to the third objective, measuring the sleep characteristics of Senior Officers.

Method

Participants

Participants were 21 male (mean age = 47.3; ± 3.4) Senior Officers in the United States Army. Senior Officers were operationally defined as holding the rank of General, or serving as Colonel and Lieutenant Colonel in key staff positions.

Procedure

Data were collected for each participant over a 60-day time period. During the initial data collection participants completed the general survey, were fitted with an actigraph and were interviewed. A member of the research team downloaded Actigraph data every one-to-two week. At the time of the download, the participant also completed an Activity Survey. During the final data collection, the participant was interviewed again.

Instruments

General Survey. The initial survey addressed questions about work habits, stressors, health, wellbeing, and family commitments.

Activity Survey. The Activity Survey briefly assessed key variables associated with the sleep cycle. The survey consisted of 11 self-report items indicating level of activity, sleep, travel, and operational demands.

Actigraph Monitoring Device. The actigraph monitoring device (AMA-32; Precision Control Devices, Fort Walton Beach, FL) measured activity that can be transformed into accurate sleep/wake periods. The device was worn on the wrist and provided a quantitative assessment of activity that was then converted into sleep or wake periods. Data were downloaded and then converted into sleep-wake cycles using the Action-W software (Version 2.1, Activity Research Services, San Diego, CA).

Interview. Senior Officers were interviewed about the challenges and stressors of their current job and how they coped with these challenges.

Results

- Actigraph sleep correlated with self-reported sleep. (Fig. 1 and 2)
- Work hours were negatively correlated with sleep.(Fig. 3 and 4)
- Higher operational demands and stress were associated with reduced sleep time. (Fig. 5 and 6)
- Sleep patterns were impacted by the work environment. (Fig. 7, 8, and 9)

Discussion

This study strives to identify the basic sleep characteristics of Senior Officers. Clearly, Senior Officers work very hard and adapt to an intense work environment by adjusting their sleep patterns as needed. The long-term effects of this adjustment are not well understood. Further analysis will integrate the results of the interviews with Senior Officers in an attempt to develop a model for understanding the unique demands that currently face the Senior Officers. It is essential that Senior Officers maintain cognitive readiness in order to maximize their performance and wellbeing during periods of high workload and operations tempo.

Results I

Figure 1. Actigraph measured sleep and self-reported sleep

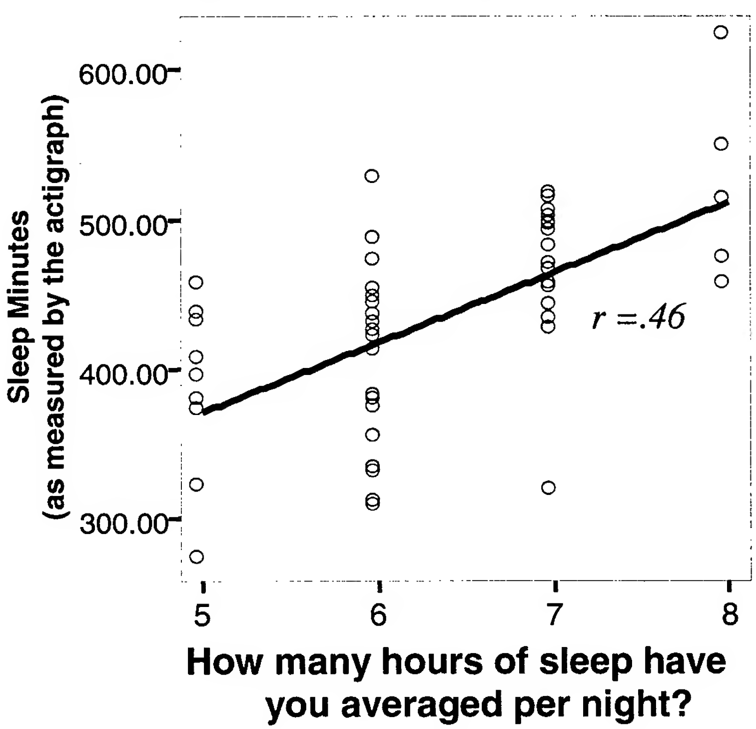


Figure 1. Actigraph measured sleep and self-reported sleep were positively correlated (Spearman correlation = 0.46; p < .01).

Figure 2. Sleep Hours by Weekend vs. Weekday

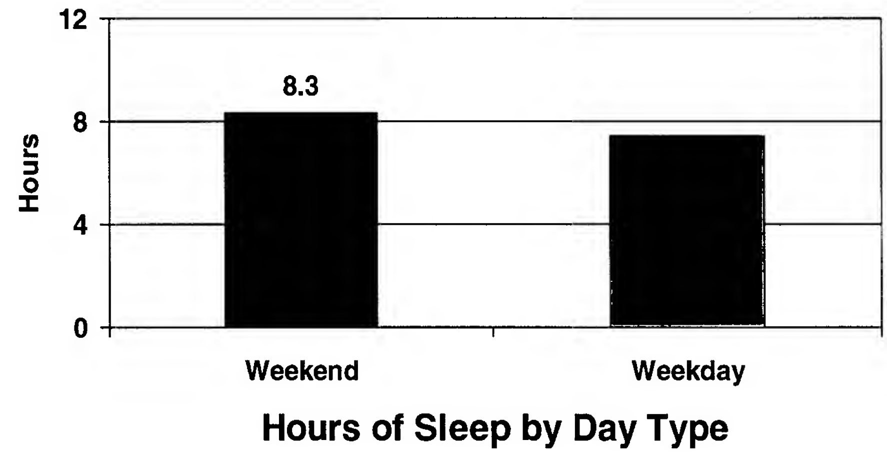


Figure 2. The mean sleep time per night as measured by the actigraph was 461.4 minutes (7.7 hours). Sleep time was significantly different ($t=-4.7$, $df=296$, $p<.001$) during the week (Monday through Friday) compared to the weekend (Saturday and Sunday) with an average of 444.8 minutes (7.4 hours) per night during the week and an average of 499.9 minutes (8.3 hours) on a weekend night.

NOTE: Weekend is defined as Saturday and Sunday; Weekday is defined as Monday through Friday

Results II

Figure 3. Average Work and Sleep Hours

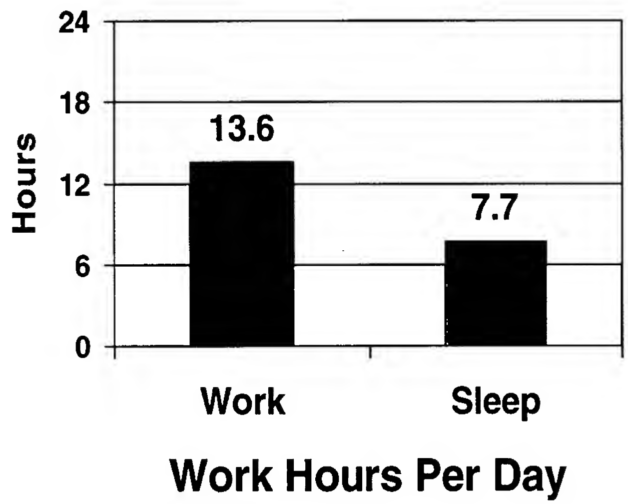


Figure 3. On average, the participants reported working 13.6 ($\pm$ 1.7) hours a day.

Figure 4. Average Work hours in relationship to Sleep Hours

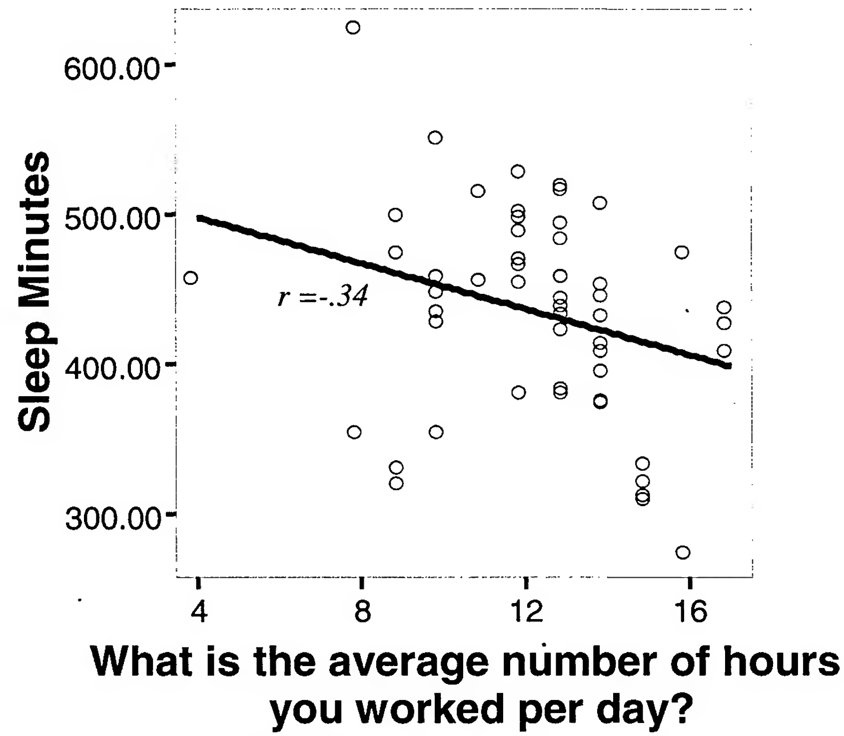


Figure 4. Number of work hours was negatively correlated with amount of sleep as measured by the actigraph (Spearman correlation = - 0.34; $p < .05$).

Results III

Figure 5. Sleep minutes by levels of operational demands.

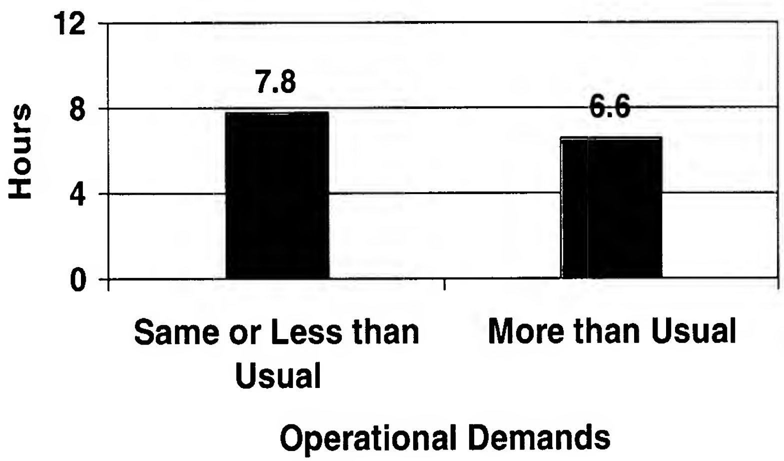


Figure 5. Those participants who reported more operational demands in the last 2 weeks (t=4.4, df=51; p<.001) experienced less sleep in the last 2 weeks than those who had the same or less operational demands

Figure 6. Sleep Episodes and Sleep Quality

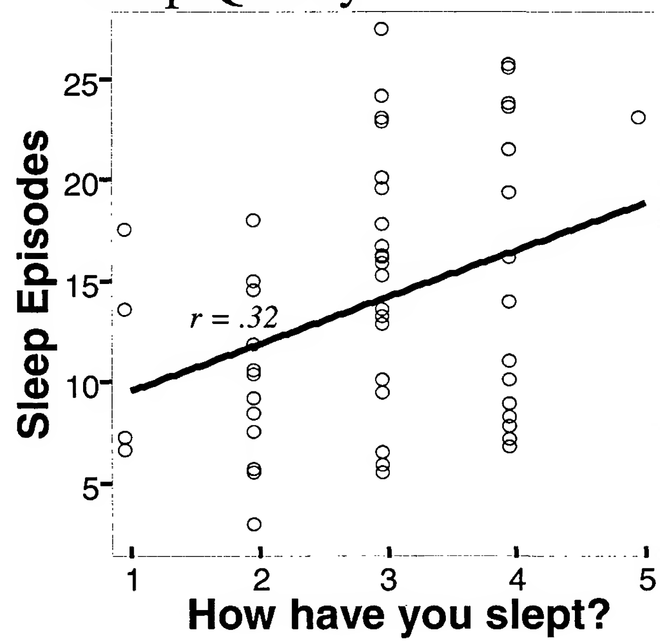


Figure 6. Subjective sleep quality was not associated with the amount of sleep, but it was related to number of sleep episodes. Reports of decreased sleep quality were correlated with an increase in sleep episodes that a participant encountered (Spearman correlation = 0.32; p < .05).

Results IV: Garrison

In Figure 7, the typical sleep pattern for a participant in garrison (home station duty) was relatively consistent throughout the work week.

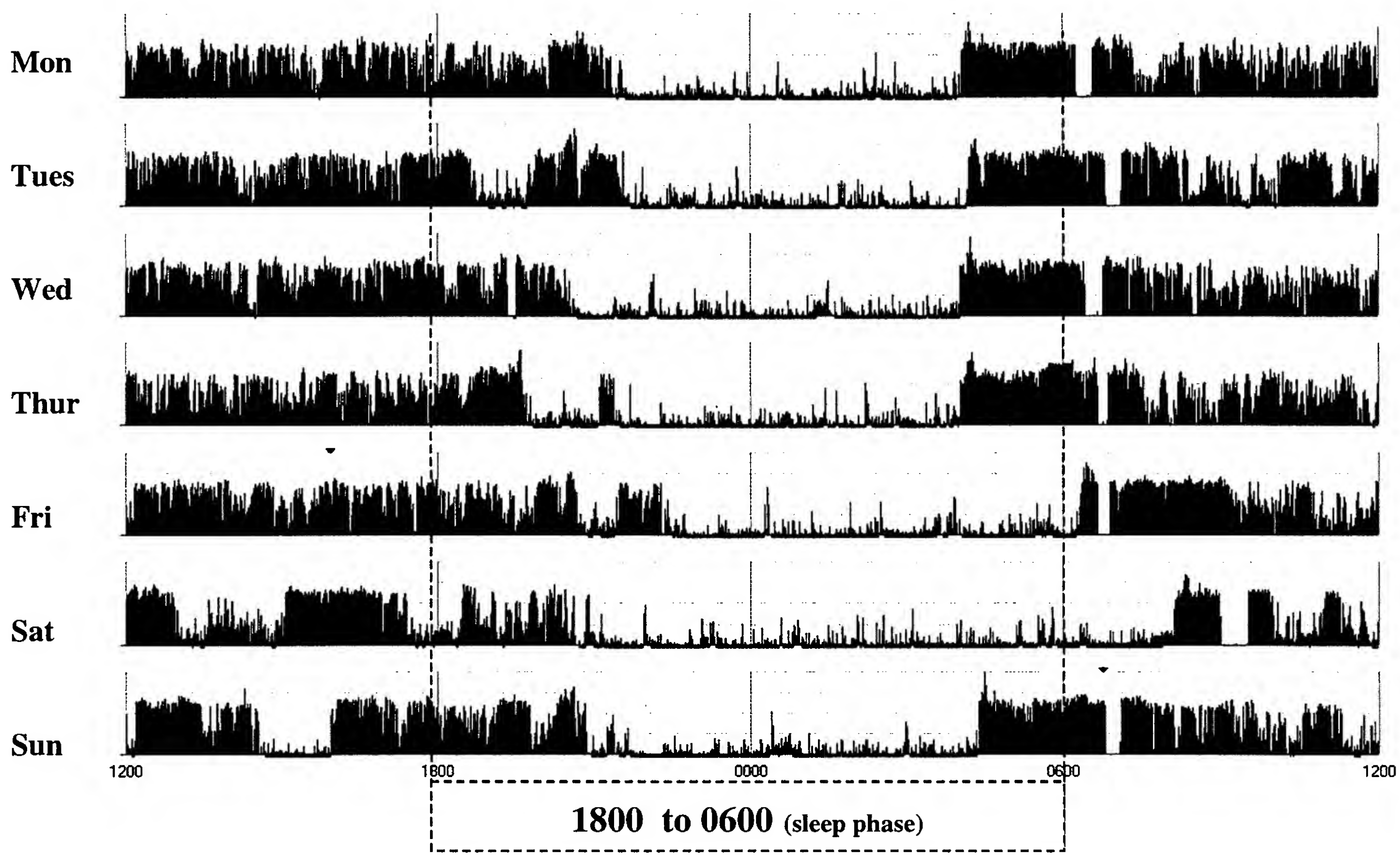
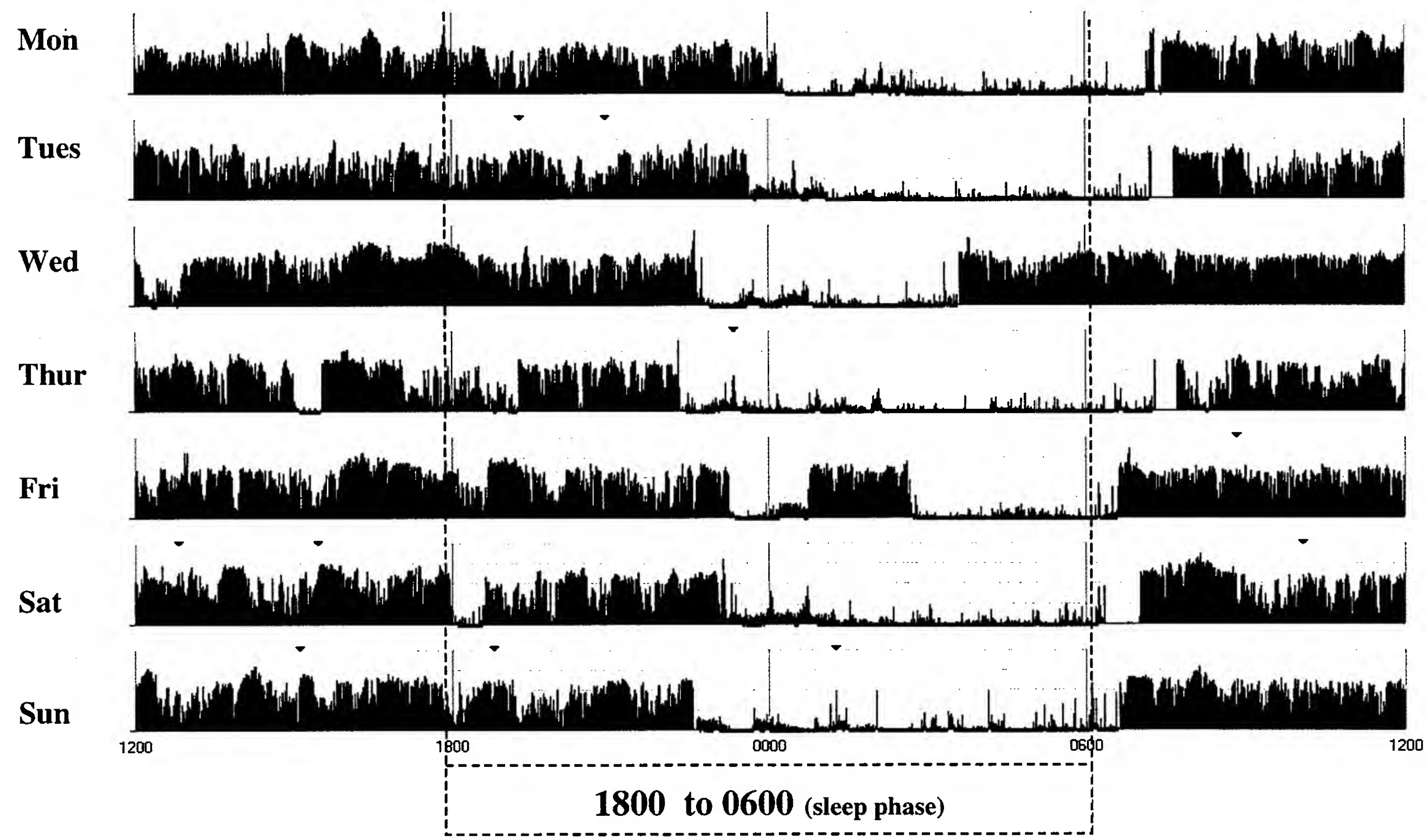


Figure 7 displays the participant's average weekday wake time is about 0400.

Results V: Training Exercise

In Figure 8, sleep patterns during military training exercise were less consistent than in garrison. In this environment, sleep onset fluctuated.



Results VI: Travel

In Figure 9, sleep patterns were examined during travel times. The effects of travel dramatically changed the leaders' sleep pattern.